INFORMATION RECORDER, INFORMATION OBTAINING METHOD AND DIGITAL CAMERA

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Abstract:
PROBLEM TO BE SOLVED: To provide an information recorder and an information obtaining method capable of preventing the undesirable deterioration of picture. SOLUTION: The information recorder for recording information including an image is provided with an image pickup unit for picking up an image and an electronic zooming processing part 200 for obtaining a selected image in a prescribed range from k the fetched image picked up by the image pickup unit and converting it to an output image of a prescribed number of pixels. The part 200 includes a selecting range condition setting part 240 for setting a condition which has to be satisfied by the range of the selected image by referring to the number of pixels in the output image. COPYRIGHT: (C)2001,JPO

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to an information recording apparatus, the information acquisition approach, and a digital camera. Especially this invention relates to the available information acquisition approach and a digital camera with the available approach in the information recording apparatus for recording the information containing an image, and its equipment.
[0002]
[Description of the Prior Art] In the conventional digital camcorder, the marginal scale factor of an electronic zoom was being fixed, in the range below a marginal scale factor, it was not concerned with the quality of the image quality of an image pick-up image, but electronic zoom processing was performed.
[0003]
[Problem(s) to be Solved by the Invention] However, too much electronic zoom processing had the problem of degrading image quality remarkably.
[0004] Then, this invention aims at offering an available digital camera for the available information acquisition approach and its approach with the information recording apparatus which can solve the above-mentioned technical problem, and its equipment. This purpose is attained by the combination of the description given in the independent term in a claim. Moreover, a subordination term specifies the further advantageous example of this invention.
[0005]
[Means for Solving the Problem] Namely, the information recording device in the 1st gestalt of this invention The image pick-up unit which is an information recording device for recording the information containing an image, and picturizes an image, Having the electronic zoom processing [which acquires the selection image of the predetermined range out of an image by incorporating, and it changes into the output image of the predetermined number of pixels] section which the image pick-up unit picturized, the electronic zoom processing section contains the selection range conditioning section which sets up the conditions which a selection image should fulfill with reference to the number of pixels of an output image.
[0006] When a selection image does not fulfill conditions, you may have further the notice unit which notifies of not fulfilling conditions. The electronic zoom processing section may regulate selection of a selection image, when a selection image does not fulfill conditions. The electronic zoom processing section may cancel regulation of selection of a selection image with directions of a user. The mode of operation which a user does not regulate beforehand may be chosen, and regulation may be canceled by continuing pushing a zoom carbon button beyond predetermined time, or pushing the carbon button to which the function for canceling regulation was assigned.
[0007] The selection range conditioning section may set up the conditions which a selection image should fulfill so that the number of pixels of a selection image may turn into beyond the predetermined multiple of the number of pixels of an output image. The selection range conditioning section may set up the conditions which a selection image should fulfill so that the number of pixels of a selection image may turn into more than the number of pixels of an output image. The selection range conditioning section may set up the conditions which a selection image should fulfill further with reference to the conditions about the image quality of an output

image. The electronic zoom processing section may permit that there are few pixels of a selection image than the number of pixels of an output image, when the conditions that the image quality of an output image is comparatively low are set up.
[0008] An information recording device may be further equipped with the display unit which displays an output image. A display unit may display the parameter relevant to the conditions which a selection image should fulfill. The selection range conditioning section may set up the conditions which a selection image should fulfill further with reference to the number of pixels which can display a display unit. When the number of pixels which can display a display unit is more than the number of pixels of an output image, the selection range conditioning section may set up the conditions which a selection image should fulfill so that all the range of an incorporation image can be chosen as a selection image. The electronic zoom processing section may perform electronic zoom processing in advance of optical zoom processing, when zoom processing is required.
[0009] The digital camera in the 1st gestalt of this invention It is a digital camera for recording the information containing an image. An image pick-up unit, The image pick-up control unit which controls an image pick-up unit, and the processing unit which processes the picturized image, It has the actuation unit which inputs directions of the user to a processing unit at least. A processing unit Out of the picturized image, the selection image of the predetermined range is acquired and the electronic zoom processing section contains the selection range conditioning section which sets up the conditions which a selection image should fulfill with reference to the number of pixels of an output image including the electronic zoom processing section changed into the output image of the predetermined number of pixels.
[0010] The 1st process which the approach in the 1st gestalt of this invention is the approach of acquiring the information containing an image, acquires an image, and defines the selection image of the predetermined range, The 2nd process which judges the propriety of transform processing to the output image which has the predetermined number of pixels from a selection image with reference to the number of pixels, and the 3rd process which changes a selection image into an output image when it is judged at the 2nd process that it is suitable are included.
[0011] The 2nd process permits transform processing, when the number of pixels of a selection image is more than the number of pixels of an output image, and when there are few pixels of a selection image than the number of pixels of an output image, it may forbid transform processing.
[0012] In addition, the outline of the above-mentioned invention is not what enumerated all the required descriptions of this invention, and the subcombination of these characterizing group can also be invented.
[0013]
[Embodiment of the Invention] Although this invention is hereafter explained through the gestalt of implementation of invention, not all the combination of the description of the following operation gestalten that do not limit invention concerning a claim and are explained in the operation gestalt is necessarily indispensable for the solution means of invention.
[0014] (Operation gestalt 1) Drawing 1 shows the configuration of the digital camera as an example of the information recording apparatus concerning the 1st operation gestalt of this invention. The digital camera 10 of this operation gestalt mainly contains the image pick-up unit 20, the image pick-up control unit 40, the processing unit 60, the display unit 100, and the actuation unit 110.
[0015] The image pick-up unit 20 contains the device member and the electric member about photography and image formation. The image pick-up unit 20 contains the taking lens 22 which processes by incorporating an image first, diaphragm 24, a shutter 26, optics LPF (low pass filter)28 and CCD30, and the image pick-up signal-processing section 32. A taking lens 22 consists of a focal lens, a zoom lens, etc. By this configuration, a photographic subject image carries out image formation on the light-receiving side of CCD30. According to the quantity of light of the photographic subject image which carried out image formation, a charge is accumulated in each sensor element (not shown) of CCD30 (the charge is called "stored charge" below). Stored charge is read to a shift register (not shown) by the lead gate pulse, and is read one by one by the register transfer pulse as a voltage signal.
[0016] Since a digital camera 10 generally has electronic shutter ability, its mechanical shutter like a shutter 26 is not indispensable. In order to realize electronic shutter ability, a shutter drain is formed in CCD30 through the shutter gate. Stored charge will be swept out by the shutter drain if the shutter gate is driven. It is controllable

by control of the shutter gate, the time amount, i.e., the shutter speed, for accumulating a charge in each sensor element.
[0017] The color of the voltage signal outputted from CCD30, i.e., an analog signal, is separated into R, G, and B component in the image pick-up signal-processing section 32, and a white balance is adjusted first. Continuously, the image pick-up signal-processing section 32 performs a gamma correction, and A/D conversion of R, G, and the B signal is carried out one by one to required timing, and it outputs the digital image data (it is only called "digital image data" below) obtained as a result to the processing unit 60.
[0018] The image pick-up unit 20 has a finder 34 and a stroboscope 36 further. The interior of the LCD which is not illustrated may be carried out to a finder 34, and the various information from the below-mentioned Maine CPU62 grade can be displayed in a finder 34 in that case. When the energy stored in the capacitor (not shown) is supplied to discharge tube 36a, a stroboscope 36 functions because it emits light.
[0019] The image pick-up control unit 40 has the image pick-up system CPU 50 which controls the zoom mechanical component 42, the focal mechanical component 44, the diaphragm mechanical component 46, the shutter mechanical component 48, and them, the ranging sensor 52, and the photometry sensor 54. Mechanical components, such as the zoom mechanical component 42, have the driving means of a stepping motor etc., respectively. According to the depression of the below-mentioned release switch 114, the ranging sensor 52 measures the distance to a photographic subject, and the photometry sensor 54 measures photographic subject brightness. The data (only henceforth "ranging data") of the measured distance and the data (only henceforth "photometry data") of photographic subject brightness are sent to the image pick-up system CPU 50. Based on photography information, such as a zoom scale factor directed by the user through the zoom switch 118, the image pick-up system CPU 50 controls the zoom mechanical component 42 and the focal mechanical component 44, and performs adjustment of the zoom scale factor of a taking lens 22, and a focus.
[0020] The image pick-up system CPU 50 is extracted based on the digital signal addition value, i.e., AE information, of RGB on 1 image frame, and determines a value and shutter speed. According to the determined value, the diaphragm mechanical component 46 and the shutter mechanical component 48 perform adjustment of the amount of diaphragms, and closing motion of a shutter 26, respectively.
[0021] The image pick-up system CPU 50 controls luminescence of a stroboscope 36 based on photometry data, extracts it to coincidence again, and adjusts the amount of drawing of 26. When a user directs taking in of an image, CCD30 starts a charge storage and stored charge is outputted to the image pick-up signal-processing section 32 after the shutter passage of time calculated from photometry data.
[0022] The processing unit 60 has the digital camera 10 whole especially the memory control section 64 controlled by Maine CPU 62 which controls processing unit 60 self, and this, YC processing section 70, the option device control section 74, the compression elongation processing section 78, and the communication link I/F section 80. Although the electronic zoom processing section which has a characteristic function in this operation gestalt is also contained in the processing unit 60, it will explain in full detail by explanation of drawing 2 . Maine CPU 62 exchanges required information between the image pick-up systems CPU 50 by serial communication etc. The clock of Maine CPU 62 of operation is given from the clock generation machine 88. The clock generation machine 88 offers the clock of a frequency which is different also to the image pick-up system CPU 50 and the display unit 100, respectively.
[0023] The character generation section 84 and a timer 86 are put side by side in Maine CPU 62. The timer 86 was backed up by the cell and has always counted time. The information about photography time and other time information are given to Maine CPU 62 from this counted value. The character generation section 84 generates text, such as photography time and a title, and this text is suitably compounded by the photography image.
[0024] The memory control section 64 controls nonvolatile memory 66 and main memory 68. Nonvolatile memory 66 consists of an EEPROM (electric elimination and programmable ROM), FLASH memory, etc., and the data which should be held also while the power source of the digital cameras 10, such as setting information by the user and an adjustment value at the time of shipment, is off are stored. A boot program, a system program, etc. of Maine CPU 62 may be stored in nonvolatile memory 66 by the case. On the other hand, generally main memory 68 is comparatively cheap like DRAM, and consists of memory with a big capacity. Main memory 68 has the function as a frame memory to store the data outputted from the image pick-up unit 20, a function as a system memory which loads various programs, and the other functions as a work area.

Nonvolatile memory 66 and main memory 68 exchange data through each part of processing unit 60 inside and outside, and Maine Bath 82.
[0025] YC processing section 70 performs YC conversion to digital image data, and generates a luminance signal Y, color difference (chroma) signal B-Y, and R-Y. A luminance signal and a color-difference signal are once stored in main memory 68 by the memory control section 64. The compression elongation section 78 reads and compresses a luminance signal and a color-difference signal one by one from main memory 68. In this way, the compressed data (only henceforth "compressed data") are written in the memory card which is a kind of an optional equipment 76 through the option device control section 74.
[0026] The processing unit 60 has an encoder 72 further. An encoder 72 inputs a luminance signal and a color-difference signal, changes these into a video signal (NTSC and PAL signal), and outputs them from the video outlet terminal 90. When generating a video signal from the data recorded on the optional equipment 76, the data is first given through the option device control section 74 to the compression elongation section 78. It continues and the data with which required elongation processing was performed in the compression elongation section 78 are changed into a video signal by the encoder 72.
[0027] The option device control section 74 performs generation of a required signal, logical conversion, or electrical-potential-difference conversion between Maine Bath 82 and an optional equipment 76 according to the signal specification accepted in an optional equipment 76, and the bus specification of Maine Bath 82. A digital camera 10 may support the standard I/O card of PCMCIA conformity for example, other than the above-mentioned memory card as an optional equipment 76. In that case, the option device control section 74 may consist of bus control LSI for PCMCIA etc.
[0028] The communication link I/F section 80 controls protocol conversion according to the specification of the communication link specification which a digital camera 10 supports, for example, USB, RS-232C, Ethernet, etc. The communication link I/F section 80 communicates through the external instrument and connector 92 which include a network including a driver IC if needed. It is good also as a configuration which performs data transfer by original I/F among [other than such a standard specification] external instruments, such as a printer and a game machine.
[0029] The display unit 100 has the LCD monitor 102 and the LCD panel 104. They are controlled by the monitor driver 106 and the panel driver 108 which are a LCD driver, respectively. The LCD monitor 102 is formed in a camera tooth back in the magnitude of about 2 inches, and displays the screen for current photography, the reproductive mode, the zoom scale factor of photography or playback, a cell residue, time, and mode setting, a photographic subject image, etc. In this operation gestalt, the LCD monitor 102 also has a function as a notice unit which displays the notice information from the electronic zoom processing section, and displays warning of a purport with a possibility that an image may deteriorate, by performing electronic zoom processing. The LCD monitor 102 may be formed in the interior of a finder 34. The LCD panel 104 is formed in a camera top face by black and white LCD small, for example, and displays in simple information, such as image quality (FINE/NORMAL/BASIC etc.), a ban on stroboscope luminescence / luminescence, number of sheets that can be standard photoed, the number of pixels, and cell capacity.
[0030] The actuation unit 110 contains a device required in order that a user may set up or direct actuation of a digital camera 10, its mode, etc., and an electric member. The power switch 112 opts for turning on and off of the power source of a digital camera 10. The release switch 114 has two-step pushing structure of half-push and all push. As an example, AF and AE lock by half-push, taking in of a photography image is performed by all push, and it is recorded on main memory 68 and optional equipment 76 grade after required signal processing, a data compression, etc. The actuation unit 110 may receive a setup by a mode dial, a cross-joint key, etc. of a rotating type besides these switches, and they are named the functional setting section 116 generically in drawing 1 . As an example of the actuation which can be specified in the actuation unit 110, or a function, there are a "file format", "special effect", a "print", "decision/preservation", "a display change-over", etc. The zoom switch 118 determines a zoom scale factor.
[0031] The main actuation by the above configuration is as follows.
[0032] A digital camera 10 is power switched [112] off first, and power is supplied to each part of a camera. Maine CPU 62 is reading the condition of the functional setting section 116, and it judges whether a digital camera 10 is in photography mode, or it is in a playback mode.

[0033] When a camera is in photography mode, Maine CPU 62 supervises the half-push condition of the release switch 114. When a half-push condition is detected, as for Maine CPU 62, photometry data and ranging data are obtained from the photometry sensor 54 and the ranging sensor 52, respectively. Based on the obtained data, the image pick-up control unit 40 operates, and adjustment of the focus of a taking lens 22, a diaphragm, etc. is performed. If adjustment is completed, that is told to a user, alphabetic characters, such as "standby", will be displayed on the LCD monitor 102, and all the push conditions of the release switch 114 will be supervised continuously. If all push [the release switch 114], predetermined shutter time amount will be set, a shutter 26 will be closed, and the stored charge of CCD30 will be swept out to the image pick-up signal-processing section 32. The digital image data generated as a result of processing by the image pick-up signal-processing section 32 is outputted to Maine Bath 82. Digital image data is once stored in main memory 68, receives processing in YC processing section 70 and the compression elongation section 78 after this, and is recorded on an optional equipment 76 via the option device control section 74. The recorded image is displayed on the LCD monitor 102 for a while in the condition of having been frozen, and a user can know a photography image. A series of photography actuation by the above is completed.
[0034] On the other hand, when a digital camera 10 is a playback mode, Maine CPU 62 reads the image photoed at the last from main memory 68 through the memory control section 64, and displays this on the LCD monitor 102 of the display unit 100. If a user directs "passing <a thing> on" and "backward feed" in the functional setting section 116 by this condition, the image photoed before and behind the image which is indicating by current will be read, and it will be displayed on the LCD monitor 102.
[0035] Drawing 2 is the functional block diagram of the electronic zoom processing section 200 in the digital camera 10 concerning this operation gestalt. The electronic zoom processing section 200 contains the image pick-up condition attaching part 210, the zoom approach control section 220, the zoom demand attaching part 230, the selection range conditioning section 240, the selection entry section 250, the judgment section 260, and the zoom operation part 270. The illustrated function is realizable as an example with cooperation of the program stored or loaded to Maine CPU 62, the main memory 68, and nonvolatile memory 66 of drawing 1 . When Maine CPU 62 has an internal memory, a program required for the memory may be stored, and many functions may be realized as a firmware. Although drawing 2 described each function of the electronic zoom processing section 200 as a mass of configuration, in fact, these are not necessarily bundles physically and do not have the need, either. There is a considerable degree of freedom in the design which realizes the function of the electronic zoom processing section 200 in a digital camera 10.
[0036] The image pick-up condition attaching part 210 contains the number attaching part 212 of output image pixels holding the information 300 about the number of pixels of an output image, the output image image quality condition attaching part 214 holding the information 302 about the image quality of an output image, and the number attaching part 216 of LCD monitor pixels holding the information 304 about the number of display pixels of the LCD monitor 102. The information 300 about the number of pixels of an output image and the information 302 about the image quality of an output image are mainly specified by the user through the functional setting section 116. The information 304 about the number of display pixels of the LCD monitor 102 may be beforehand set up according to the specification of the LCD monitor 102. When the display resolution of the LCD monitor 102 is adjustable, it may mainly be specified by the user through the functional setting section 116. Thus, the image pick-up condition attaching part 210 receives and holds various conditions, and transmits them to the selection range conditioning section 240.
[0037] The selection range conditioning section 240 sets up the conditions which a selection image should fulfill with reference to the image pick-up conditions transmitted from the image pick-up condition attaching part 210. In this operation gestalt, the selection range conditioning section 240 sets up the lower limit of the number of pixels of a selection image. The setting approach of conditions is explained in full detail in the case of explanation of drawing 3 .
[0038] The zoom demand attaching part 230 holds the zoom demand signal 310. The zoom demand signal 310 is generated when a user does the depression of the zoom switch 118. If the zoom demand signal 310 is inputted into the zoom demand attaching part 230, the zoom approach control section 220 will judge the zoom approach. Since the digital camera 10 of this operation gestalt has the optical zoom function, as for the zoom approach control section 220, which judges whether it is suitable among optical zoom and an electronic zoom. When the

zoom approach control signal 308 is inputted at this time, the zoom approach may be judged according to those directions. For example, when the zoom switch 118 is pushed, a user pushing a shift carbon button (not shown), you may be the configuration that the zoom approach control signal 308 over which priority is given to electronic zoom processing is inputted into the zoom approach control section 220. When it judges that optical zoom processing is appropriate for the zoom approach control section 220, the optical zoom demand signal 324 is emitted, and when it judges that electronic zoom processing is appropriate, the electronic zoom demand signal 326 is emitted to the selection entry section 250. The optical zoom demand signal 324 may be transmitted to the zoom mechanical component 42 through the image pick-up system CPU 50, and may be transmitted to the direct zoom mechanical component 42. When a digital camera 10 does not have an optical zoom function, there may not be the zoom approach control section 220. In that case, electronic zoom processing is always chosen.

[0039] The zoom approach control section 220 may perform electronic zoom processing in advance of optical zoom processing, when zoom processing is required through the zoom switch 118 from a user. Since it is necessary to drive a zoom motor to perform optical zoom processing, optical zoom processing requires much power and time amount rather than electronic zoom processing. By performing electronic zoom processing in advance of optical zoom processing, power-saving and improvement in the speed can be attained.

[0040] The zoom approach control section 220 chooses electronic zoom processing, when only time amount with the zoom switch 118 shorter than predetermined time amount is pushed, and when [with the zoom switch 118 longer than predetermined time amount] a time amount depression is carried out, it may choose optical zoom processing. According to this, a desired image can be more efficiently obtained by performing rough framing by optical zoom processing, and performing fine adjustment by electronic zoom processing. Moreover, it is also possible to control combining optical zoom processing and electronic zoom processing in consideration of the zoom location of optical system, the operation approach of electronic zoom processing, etc.

[0041] The selection entry section 250 will set up the range of a selection image, if the electronic zoom demand signal 326 is received. The selection entry section 250 sets up the selection image of the larger range than the selection image by which a current setup is carried out, when the selection image of the range smaller than the selection image by which a current setup is carried out when expansion processing is required is set up and contraction processing is required. The information on the range of the set-up selection image is transmitted to the judgment section 260.

[0042] The judgment section 260 judges whether the information on the selection image transmitted from the selection entry section 250 fulfills the conditions set up by the selection range conditioning section 240. When conditions are fulfilled, the judgment section 260 directs electronic zoom processing to the zoom operation part 270. When conditions are not fulfilled, the judgment section 260 judges the existence of the zoom forcing signal 306. If the zoom forcing signal 306 is not inputted, the judgment section 260 regulates electronic zoom processing, and cancels selection of a selection image. At this time, the judgment section 260 emits the alarm signal 322 which tells not performing electronic zoom processing. When the LCD monitor 102 as an example of a notice unit displays warning in response to the alarm signal 322, if a user does a zoom more than this, he can know that there is a possibility of causing degradation whose image quality is not desirable. The judgment section 260 may regulate electronic zoom processing, without generating the alarm signal 322. According to this, a user can picturize, without being conscious of degradation of image quality. When the zoom forcing signal 306 is inputted by directions of a user, the judgment section 260 directs electronic zoom processing to the zoom operation part 270. At this time, the alarm signal 322 may be emitted to coincidence. According to this, it can reconfirm to a user that there is a possibility that image quality may deteriorate. The zoom forcing signal 306 may be generated when the zoom switch 118 continues being pushed beyond predetermined time. The carbon button to which the function to generate the zoom forcing signal 306 was assigned may be prepared. The function to force electronic zoom processing may be prepared as one of the modes of operation which a user can set up through the functional setting section 116. When the function to force electronic zoom processing is chosen, the judgment section 260 is not concerned with whether the selection image fulfills conditions, but directs electronic zoom processing to the zoom operation part 270. When the selection image does not fulfill conditions at this time, the alarm signal 322 may be emitted. According to this, even when the user has chosen

the electronic zoom forcible function accidentally, a user can be told about that there is a possibility that image quality may deteriorate.

[0043] The zoom operation part 270 performs electronic zoom processing in response to directions of the judgment section 260. The zoom operation part 270 is changed into the output image 402 which has the predetermined number of pixels for the selection image which the image pick-up unit 20 picturized, and which incorporated, acquired the image 400 and the selection entry section 250 of them set up. The output image 402 is stored in main memory 68, and is displayed on the LCD monitor 102.

[0044] Drawing 3 is drawing for explaining actuation of the electronic zoom processing section 200 of this operation gestalt. Drawing 3 (a) shows the output [which the image pick-up unit 20 picturized] image 402 which has an image 400 and the predetermined number of pixels by incorporating. The number of pixels of the incorporation image 400 is the number and abbreviation identitas of an image sensor of CCD30. The number of pixels of the output image 402 is specified by the user through the functional setting section 116. Drawing 3 (b) and drawing 3 (c) show the selection image 404 set up by the selection entry section 250. There are more pixels of the selection image 404 in drawing 3 (b) than the number of pixels of the output image 402. At this time, the zoom operation part 270 thins out the pixel of the selection image 404, and changes it into the output image 402. There are few pixels of the selection image 404 in drawing 3 (c) than the number of pixels of the output image 402. At this time, the zoom operation part 270 interpolates between the pixel of a selection image, and pixels, and changes it into the output image 402. The zoom operation part 270 may substitute the average of the pixel value of the pixel located in the perimeter for the pixel value of the pixel which should be interpolated newly.

[0045] When the number of pixels of the selection image 404 is less than the number of pixels of the output image 402 so that explanation of drawing 3 may show, the processing which interpolates the pixel which is not in fact is needed. For this reason, when too much electronic zoom processing is performed, there is a possibility of causing degradation whose image quality of the output image 402 is not desirable. In order to avoid this, the selection range conditioning section 240 sets the lower limit of the number of pixels of the selection image 404 as a value equal to the predetermined multiple of the number of pixels of the output image 402, and restricts too much electronic zoom processing. A predetermined multiple may be determined in consideration of the resolution of the number of pixels of the output image 402, the approach of pixel interpolation processing, image pick-up conditions, and optical system etc. Preferably, the selection range conditioning section 240 is good to set the lower limit of the number of pixels of the selection image 404 as a value equal to the number of pixels of the output image 402. According to this, since the number of pixels of the selection image 404 turns into more than the number of pixels of the output image 402, it is not necessary to carry out pixel interpolation processing, and degradation of image quality can be prevented. When there are comparatively many pixels of the output image 402, even if it performs some pixel interpolation processing, it may not have big effect on the image quality of the output image 402. In such a case, one or less value may be set up as a predetermined multiple. Preferably, the selection range conditioning section 240 is good to set the lower limit of the number of pixels of the selection image 404 as 0.5 or more times of the number of pixels of the output image 402. Thus, the selection range conditioning section 240 sets up the conditions which the selection image 404 should fulfill with reference to the number of pixels of the output image 402.

[0046] The selection range conditioning section 240 may set up the conditions which the selection image 404 should fulfill further with reference to the conditions about the image quality of the output image 402. As conditions about the image quality of the output image 402, there are a rate of picture compression, sharpness, a white balance, luminance distribution, etc., for example. These conditions are mainly specified by the user through the functional setting section 116, and are stored in the output image image quality condition attaching part 214. At the time of the mode in which the image quality of the output image 402 is allowed to be comparatively low, you may permit that the selection range conditioning section 240 has few pixels of the selection image 404 than the number of pixels of the output image 402. At this time, the selection range conditioning section 240 sets up a value only with few predetermined values as a lower limit of the number of pixels of the selection image 404 than the number of pixels of the output image 402. This predetermined value is determined with reference to the image quality of the output image 402 generated by carrying out expansion interpolation of the selection image 404, and the image quality conditions currently held at the output image

image quality condition attaching part 214. According to this, the zoom marginal scale factor suitable for the image quality conditions which the user chose can be set up.
[0047] The selection range conditioning section 240 may set up the conditions which the selection image 404 should fulfill further with reference to the number of pixels which can display the LCD monitor 102 as an example of a display unit. When the number of pixels which can display the LCD monitor 102 is more than the number of pixels of the output image 402, a user can check the image quality of the output image 402 by looking. The lower limit of the number of pixels of the selection image 404 is set as 0, and you may enable it to choose all the range of the incorporation image 400 as a selection image 404 at this time. According to this, when the image quality of the output image 402 deteriorates by electronic zoom processing, the output image 402 is first shown to a user and a user actually checks it by looking, it can judge whether the user itself performs electronic zoom processing. When there are few pixels which can display the LCD monitor 102 than the number of pixels of the output image 402, since a user cannot check actual image quality of the output image 402 by looking, the judgment section 260 judges the propriety of electronic zoom processing instead of a user.
[0048] Drawing 4 shows the example of a display of the LCD monitor 102 of this operation gestalt. In addition to an output image, photography mode, a date, time of day, the frame for automatic focuses, etc. are displayed on coincidence by the LCD monitor 102, but since it is easy, only the example of a display of a zoom scale factor is shown in it. The digital camera 10 of this operation gestalt is a design expandable up to 3 times, respectively about the image by optical zoom processing and electronic zoom processing as an example. As for drawing 4 (a), optical zoom processing shows the example of a display in case electronic zoom processing can be realized up to 3 times up to 3 times. The zoom possible scale-factor display 410 which shows a zoom scale factor realizable in the current mode is displayed on the bottom of screen. The zoom possible scale-factor display 410 is for displaying the parameter relevant to the conditions with which the selection image 404 should fill the electronic zoom scale-factor display 414 including the optical zoom possible scale-factor display 412 and the electronic zoom possible scale-factor display 414. The zoom scale-factor display 416 which shows the zoom scale factor by which current implementation is carried out doubles, and is displayed on the interior of the zoom possible scale-factor display 410. The zoom scale-factor display 416 will change area in proportion to a zoom scale factor, if a current zoom scale factor is changed by the depression of the zoom switch 118.
[0049] As for drawing 4 (b), optical zoom processing shows the example of a display in case electronic zoom processing can be realized to twice up to 3 times. Since the scale factor in which electronic zoom processing is possible fell with the increment in the number of pixels of the output image 400, it is decreasing compared with the case where the area of the electronic zoom possible scale-factor display 414 is drawing 4 (a). By not concerning optical zoom processing with the number of pixels of the output image 400, since it is possible up to 3 times, the area of the optical zoom possible scale-factor display 412 is not different from the case of drawing 4 (a).
[0050] The zoom switch 118 is further pushed from the condition of drawing 4 (b), and drawing 4 (c) shows the condition of having reached the marginal scale factor. At this time, the judgment section 260 has emitted the alarm signal 322, and, in response, the LCD monitor 102 performs an alarm display. For example, the zoom scale-factor display 416 may be expressed as a red color, the zoom scale-factor display 416 may be indicated by flashing, and a warning message or a warning symbol may be displayed. A user gets to know that saw the alarm display and zoom processing reached the marginal scale factor, and determines whether force electronic zoom processing. Since in a configuration of forcing electronic zoom processing by carrying out the depression of the zoom switch 118 beyond predetermined time amount zoom processing once stops when a marginal scale factor is reached, even if it does not perform an alarm display, a user can know having reached the marginal scale factor. An alarm does not need to be displayed at this time. Since he can understand that the user reached the marginal scale factor like this operation gestalt even if it does not perform an alarm display when it is the display which the relation between the present zoom scale factor and a marginal scale factor understands clearly, it is not necessary to perform an alarm display.
[0051] In this operation gestalt, although the zoom possible scale-factor display 410 was carrying out the rectangular configuration, a zoom possible scale factor and a current zoom scale factor may be displayed using a figure. Moreover, only the whole scale factor may be displayed, without distinguishing an optical zoom scale factor and an electronic zoom scale factor. According to this, a user can get the output image which fulfills the

specified conditions, without being conscious of the zoom approach.
[0052] Drawing 5 is a flow chart which shows the approach of the electronic zoom processing concerning this operation gestalt. First, initialization conditions will be inputted into the image pick-up condition attaching part 210, if the power switch 112 is pushed, a power source is turned on and photography mode is chosen (S102). This initialization condition may be conditions chosen at the time of the last photography, and may be the default set up at the time of factory shipments. Then, the conditions which a selection image should fulfill with reference to the various conditions on which the selection range conditioning section 240 was held at the image pick-up condition attaching part 210 are set up (S104). Above required initial processing is ended and a digital camera 10 will be in an image pick-up standby condition. At this time, the image which the image pick-up unit 20 picturized is expressed to the LCD monitor 102 as real time.
[0053] Maine CPU 62 supervises the demand of a user transmitted from the actuation unit 110, and when there is a demand, it directs the processing according to it. the time of the demand which changes image pick-up conditions from the functional setting section 116 being transmitted -- (Y of S106) -- new image pick-up conditions are again inputted into return and the image pick-up condition attaching part 210 S102, and the selection range conditioning section 240 resets conditions. When the release switch 114 is pushed, (Y of S108) and image pick-up processing are performed (S130), and an image pick-up is completed. In the digital camera with which an automatic focus function and automatic exposure control were carried, if an automatic focus function and automatic exposure control are locked and the release switch 114 is further pushed in to the last when half-push [the release switch 114] as mentioned above, image pick-up processing S130 may be performed. When it is released without being pushed in to the last after half-push [the release switch 114], it may return to S106 again and you may be in an image pick-up standby condition.
[0054] When the zoom switch 118 is operated, the zoom demand signal 308 is transmitted to (Y of S110), and the zoom demand attaching part 230. Then, the zoom approach is determined, the zoom approach control section 220 referring to the zoom approach control signal 306 (S112). When the zoom approach control section 220 chooses optical zoom processing, it progresses to Y, the optical zoom demand signal 324 is transmitted to the zoom mechanical component 42 through the image pick-up system CPU 50, and optical zoom processing is performed (S120). After optical zoom processing is completed, return and Maine CPU 62 supervise the next demand to S106 again. When the zoom approach control section 220 chooses electronic zoom processing, it progresses to N, the electronic zoom demand signal 326 is transmitted to the selection entry section 250, and the selection entry section 250 sets up the selection range (S114). Then, the selection range where the selection entry section 250 set up the judgment section 260 judges whether the conditions which the selection range conditioning section 240 set up are fulfilled (S116). If the selection range fulfills conditions, it progresses to Y, and the zoom operation part 270 will perform electronic zoom processing, and will output the output picture signal 402 (S118). After an output image passes through required processing, it is stored in main memory 68 and displayed on the LCD monitor 102. After electronic zoom processing is completed, return and Maine CPU 62 supervise the next demand to S106 again. If the selection range does not fulfill conditions, it progresses to N, and after the judgment section 260 emits the alarm signal 322 and passes through required processing, the LCD monitor 102 displays warning (S122). Then, it judges whether the judgment section 260 forces electronic zoom processing (S124). When forcing electronic zoom processing, it progresses to Y and electronic zoom processing is performed (S118). Although an alarm display may be canceled at this time, in order to tell a user about the image having deteriorated, it is desirable to continue displaying an alarm. When not forcing electronic zoom processing, it progresses to N, an alarm is canceled (S126), the selection range is canceled, and it returns to the original condition (S128), and returns to S106, without performing electronic zoom processing.
[0055] The case where priority is given to optical zoom processing in actuation when the zoom switch 118 continues being pushed is explained as an example. When the zoom switch 118 is pushed on an expansion side, if optical zoom is possible, optical zoom processing will be performed. If the zoom switch 118 continues being pushed, optical zoom processing will reach a limitation and electronic zoom processing will be performed after that. When the zoom switch 118 furthermore continues being pushed, it stops fulfilling the conditions to which the selection range was set. It means that this will cause degradation whose image is not desirable if electronic zoom processing is performed more than this. At this time, electronic zoom processing is once regulated, even if it pushes the zoom switch 118, electronic zoom processing is not performed, but an alarm is displayed on the

LCD monitor 102. It will know that an image will deteriorate, if a user looks at an alarm display and a zoom is carried out more than this. When a user wants to admit degradation of an image and to perform zoom processing, by continuing pushing the zoom switch 118 beyond predetermined time amount, the electronic zoom forcing signal 328 is transmitted and electronic zoom processing is performed again. The alarm which tells degradation of an image is continuing being displayed at this time. Then, an alarm display will be canceled, if it comes to fulfill the conditions to which the selection range was set when the zoom switch 118 is pushed on a contraction side and contraction processing is performed. Furthermore the zoom switch 118 is continuously pushed on a contraction side, and if the selection range is in confusion and it becomes the same as that of the whole image, contraction processing by optical zoom processing will be performed after that.

[0056] Although priority was given to optical zoom processing in the above-mentioned explanation, priority may be given to electronic zoom processing as mentioned above. According to this, the power consumption in the case of zoom processing can be held down. Moreover, high-speed zoom processing is realizable.

[0057] In this operation gestalt, although the LCD monitor 102 had the function of a notice unit, notice units which sound an audible tone, such as a loudspeaker and a warning lamp, may be prepared.

[0058] Since according to this operation gestalt regulation or warning is displayed for electronic zoom processing when there is a possibility of causing degradation whose image quality is not desirable by electronic zoom processing, degradation of the image quality by too much electronic zoom processing which is not meant can be prevented.

[0059] As mentioned above, although this invention was explained using the gestalt of operation, the technical range of this invention is not limited to the range given in the gestalt of the above-mentioned implementation. It is clear to this contractor that modification or amelioration various in the gestalt of the above-mentioned implementation can be added. It is clear from the publication of a claim that the gestalt's which added such modification or amelioration it may be contained in the technical range of this invention.

[0060]

[Effect of the Invention] According to this invention, the informational information recording device and the informational information acquisition approach which can prevent degradation which is not desirable can be offered so that clearly from the above-mentioned explanation.

[Translation done.]